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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Nevein T. SULTAN, et al.	
Serial No.:	09/899,265	
Filed:	July 6, 2001	
Title:	Policy-Based Forwarding In Open Shortest Path First (OSPF) Networks	
Group Art Unit:	2152	
Examiner:	Ramsey REFAI	Tel: 571--272-3975
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REPLY BRIEF

This is in response to the Examiner's Answer mailed November 3, 2008. Pursuant to 37 CFR § 41.41(a)(1), the Applicant wishes to maintain the present appeal, and submits the following Reply Brief.

1) Real Party in Interest

As set out in Applicant's Brief filed August 15, 2008, the following grounds of rejection are presented for review in the present appeal: the real party of interest is Nortel Networks Limited, by virtue of an assignment executed by the inventors in favour of Nortel Networks Limited. recorded at Reel/Frame 011971/0880.

2) Related Appeals and Interferences

None.

3) Status of Claims

As set out in Applicant's Brief filed August 15, 2008, the status of the claims is as follows:

- claims 9, 16 and 26 are cancelled;
- claims 1-8, 10- 15, 17-25 and 27-31 are pending;
- claims 1-8, 10-15, 17-25 and 27-31 stand rejected under 35 U.S.C. § 102(e) as being anticipated by United States Patent No. 6,275,492.(Zhang).

Claims 1-8, 10-1 5, 17-25 and 27-31 are in the present Appeal.

4) Status of Amendments

As set out in Applicant's Brief filed August 15, 2008, the claims currently stand as amended in Applicant's response filed on January 16, 2007. A copy of the current claims is provided in the Claims Appendix below.

5) Summary of Claimed Subject Matter

The following summary of the Claimed Subject matter is duplicated from Applicant's Brief filed August 15, 2008.

As is well known in the art, in a data network (such as an Open Shortest Path First - OSPF network), traffic forwarding is typically controlled by forwarding (or routing) tables maintained by each router in the network. The forwarding table(s) of each node is(are)

constructed using information received by Link State Advertisements (LSAs) received by the node. The present invention is directed to methods and systems for enabling policy-based control over traffic forwarding within the network, by modifying the way in which LSAs are propagated through the network, which in turn controls the information contained in the forwarding tables of each node of the network. Claims 1, 12 and 25 are independent claims.

Claim 1 defines a method of enabling policy-based traffic forwarding in a data network [2 , FIG. 1] having at least two area border routers (ABRs) [8a-b and 12, FIG. 1], the method comprising steps of

> generating a link state advertisement (LSA) message [36, 54 and 62, FIG. 3], and asserting a route tag in respect of the generated LSA message [paragraph 42]; and
>
> at each ABR receiving the LSA message, controlling propagation of the received LSA, into an area of the data network hosted by the ABR, using a respective forwarding policy having a match criteria corresponding to the asserted route tag [paragraph 42-43];
>
> wherein the respective forwarding policy of a first ABR differs from that of a second ABR [paragraph 45 et seq.], such that the received LSA message is flooded into the area hosted by the first ABR, and not flooded into the respective area hosted by the second ABR [paragraph 38]

Claim 12 defines a router [8a-b and 12, FIG, 1] for enabling policy-based traffic forwarding in a data network [2 , FIG. 1] having at least two routers, the router [8a-b and 12, FIG. 1] comprising means for controlling propagation of a received link state advertisement (LSA) message [36, 54 and 62, FIG. 3], into an area of the data network [4a-c, FIG. 1] hosted by the router, using a respective forwarding policy having a match criteria corresponding to a route tag asserted in respect of the LSA [paragraph 42], wherein the forwarding policy of the router differs from that of a second router [paragraph 45 et seq.], such that the received LSA message is flooded into the area hosted by the router, and not flooded into a respective second area hosted by the second router [paragraph 38].

Claim 25 defines a software program stored on a computer readable medium for controlling a router [8a-b and 12, FIG. 1] to enable policy-based traffic forwarding in a data network [2 , FIG. 1] having at least two routers [8a-b and 12, FIG. 1], each router hosting an area [4a-c, FIG. 1] of the data network, the software program comprising program code adapted to control propagation of a received link state advertisement (LSA) message [36, 54 and 62, FIG. 3], into a respective area [4a-c, FIG. 1] of the data network hosted by the router, using a respective forwarding policy having a match criteria corresponding to a route tag asserted in respect of the LSA [paragraph 42], wherein the respective forwarding policy of a first router differs from that of a second router [paragraph 45 et seq.], such that the received LSA message is flooded into the area hosted by the first router, and not flooded into a respective second area hosted by the second router [paragraph 38].

6) Grounds of Rejections to be Reviewed on Appeal

As set out in Applicant's Brief filed August 15, 2008, the following grounds of rejection are presented for review in the present appeal:

- Whether claims 1-8, 10-15, 17-25 and 27-31 are unpatentable under 35 U.S.C. § 102(e), over the teaching of United States Patent No. 6,275,492 (Zhang).

7) Response to Argument

In Section 10 of the Examiner's Answer mailed November 3, 2008, the Examiner argues:

> "Zhang is directed to the routing of data (including link state advertisements (LSAs)) using area routers by using match criteria. The Routers advertise LSAs into the designated network area in which the router resides. The routers do not advertise LSAs into undesignated network areas. The routing can be implemented using "tag switching" which forwards data packets based on tags inserted into the data packet. … Figure 1 shows multiple routers, each router responsible for a portion of the network and only advertise LSAs into its respective network area (see at least figure 1, column

> 3, lines 15-41). When a router receives a data packet, it determines from the route tag whether the data packet is destined for its domain by matching the switch tag information to its own information…" [underlining added]

Applicant respectfully points out that this line of argument appears to be based on a fundamental error, in that the Examiner is equating data packets and LSAs. Thus, for example, the examiner refers to col 3, line 15-41of Zhang, which describes the generation of LSAs by each router, and then continues with a discussion of tag-switching of data packets. These arguments can be logically consistent with each other, and with the Examiner's conclusions regarding the teaching of Zhang as a whole, only if LSAs and data packets are treated as being equivalent.

However, the person of ordinary skill in the art will instantly recall that LSAs and data packets are not equivalent.

Applicant understands that claims must be given their broadest reasonable interpretation consistent with the specification. [MPEP 2111]. Applicant further notes that:

- "USPTO personnel must always remember to use the perspective of one of ordinary skill in the art. Claims and disclosures are not to be evaluated in a vacuum." [MPEP 2106(II) (c)]; and
- "The broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. In re Cortright, 165 F.3d 1353, 1359, 49 USPQ2d 1464, 1468 (Fed. Cir. 1999)" [MPEP 2111]

The present claims are explicitly drawn to methods and systems for enabling policy-based control over traffic forwarding within the network, by modifying the way in which LSAs are propagated through the network. The present specification clearly describes that the flooding of LSAs is controlled. Nothing in the present claims or specification supports interpreting the claim limitation to LSAs so broadly as to encompass data packets.

Furthermore, LSAs are well known in the art, as is the distinction between LSAs and data packets. Among the multitude of differences:

- LSAs do not have a destination address, so address-based forwarding, which is commonly used for data packets, cannot be used to forward LSAs;

- tag-routing, which confines propagation of a data packet to follow a predetermined route through the network is never used to control LSA propagation, because that would defeat the purpose of the LSAs and ultimately render the entire network inoperative.

With specific reference to the second of these points, Zhang teaches that, in "a link state protocol, ... each node in the network knows the network topology such that the node can calculate routes through the network using the known topology. The link state information is distributed to network nodes using a series of Link State Advertisements (LSAs) originated by routers and other nodes in the network." [See Zhang, col 1, lines 27-35] Obviously, if propagation of LSAs is restricted to predetermined routes, then only those specific routers along the identified route would receive that LSA. Over time, this would result in different routers (within the same domain) having radically different information regarding the network topology. Absent the teaching of the present invention, the person of ordinary skill in the art will recognise that network instability and failure would be almost inevitable under those conditions. It is noted that Zhang explicitly refers to tag-routing only with reference to data packets. Zhang does not mention using tag-routing in the context of LSA flooding.

The present invention uses the route tag field of each LSA to control forwarding of LSAs by Area Border Routers (ABRs). The person of ordinary skill in the art will recognise that the claimed operation inherently means that routers within two different domains will have respective different information regarding the network topology. The present invention exploits this result to control traffic forwarding the network, and avoids the expected network instability by forcing the "disconnect" to occur at the ABR; so that all of the routers within any one domain will have the same topology information (which may differ from the topology information available to routers in a different autonomous area). The person of ordinary skill in

the art will recognise that conventional "tag routing", as described by Zhang, cannot provide this result. The person of ordinary skill in the art will also recognise that, prior to the teaching of the present invention, there were no known methods of deliberately creating discontinuities in the topology information available to each router, as a matter of policy, to control traffic forwarding in the network.

The person of ordinary skill in the art will therefore be intimately aware of the differences between LSAs and data packets, and so will interpret the terms of the present claims in light of this knowledge. Thus for example, the person of ordinary skill in the art will recognise that different Link State Protocols use respective different terms to refer to Link State Advertisements (LSAs), and so would not interpret the claims so narrowly as to exclude those. On the other hand, the person of ordinary skill in the art would not interpret the present claim elements so broadly as to encompass methods of forwarding data packets, because the person of ordinary skill in the art will clearly understand that an LSA (by any name) is not a data packet.

In light of the foregoing, Applicant maintains that it is simply not reasonable, in light of the specification and the well known prior art, to interpret the claim limitation to LSAs so broadly as to somehow encompass data packets.

In light of the foregoing, it is submitted that claims 1, 12 and 25 and their dependencies are in fact patentable under 35 U.S.C. § 102(e), over the teaching of United States Patent No. 6,275,492 (Zhang). Reconsideration and withdrawal of the claim rejections under 35 U.S.C. § 102(e) in view of United States Patent No. 6,275,492 (Zhang) is believed to be in order, and such action is courteously solicited.

8) Claims Appendix

Claims involved in the Appeal

1. [PREVIOUSLY AMENDED] A method of enabling policy-based traffic forwarding in a data network having at least two area border routers (ABRs), the method comprising steps of:

generating a link state advertisement (LSA) message, and asserting a route tag in respect of the generated LSA message; and

at each ABR receiving the LSA message, controlling propagation of the received LSA, into an area of the data network hosted by the ABR, using a respective forwarding policy having a match criteria corresponding to the asserted route tag;

wherein the respective forwarding policy of a first ABR differs from that of a second ABR, such that the received LSA message is flooded into the area hosted by the first ABR, and not flooded into the respective area hosted by the second ABR.

2. [ORIGINAL] A method as claimed in claim 1, wherein the data network is an Open Shortest Path first (OSPF) network.

3. [ORIGINAL] A method as claimed in claim 1, wherein the route tag comprises one of:

an internal route tag associated with an address located within an autonomous system of the data network; and

an external route tag associated with an address located outside the autonomous system.

4. [PREVIOUSLY AMENDED] A method as claimed in claim 1, wherein the step of asserting a route tag comprises steps of:

setting a route tag value respecting the generated LSA; and

inserting the route tag value into a predetermined field of the generated LSA.

5. [PREVIOUSLY AMENDED] A method as claimed in claim 4, wherein the route tag value is set by a policy having a match criteria corresponding to a predetermined attribute of the generated LSA.

6. [PREVIOUSLY AMENDED] A method as claimed in claim 5, wherein the predetermined attribute comprises any one or more of: a source address; a source area; a destination address; and a destination area.

7. [PREVIOUSLY AMENDED] A method as claimed in claim 4, wherein the generated LSA is a Type-5 LSA, and the step of inserting the route tag comprises a step of inserting the route tag value into an external route tag field of the generated LSA.

8. [ORIGINAL] A method as claimed in claim 4, wherein the step of inserting the route tag comprises a step of inserting the route tag value into an internal route tag field of a modified Type-3 LSA.

9. [CANCELLED]

10. [PREVIOUSLY AMENDED] A method as claimed in claim 1, wherein the forwarding policy corresponds to one of:

a pass decision, in which the received LSA is forwarded to a downstream link; and

a discard decision, in which the received LSA is discarded without forwarding.

11. [PREVIOUSLY AMENDED] A method as claimed in claim 10, wherein implementation of the forwarding policy further comprises a step of updating a forwarding table using information contained in the received LSA as either one of: an inclusion route; and an exclusion route.

12. [PREVIOUSLY AMENDED] A router for enabling policy-based traffic forwarding in a data network having at least two routers, the router comprising means for controlling propagation of a received link state advertisement (LSA) message, into an area of the

data network hosted by the router, using a respective forwarding policy having a match criteria corresponding to a route tag asserted in respect of the LSA, wherein the forwarding policy of the router differs from that of a second router, such that the received LSA message is flooded into the area hosted by the router, and not flooded into a respective second area hosted by the second router.

13. [ORIGINAL] A router as claimed in claim 12, wherein the data network comprises an Open Shortest Path first (OSPF) network.

14. [ORIGINAL] A router as claimed in claim 13, wherein the router comprises any one of an autonomous system border router, and an area border router.

15. [ORIGINAL] A router as claimed in claim 12, wherein the route tag comprises one of:

an internal route tag associated with an address located within an autonomous system of the data network; and

an external route tag associated with an address located outside the autonomous system.

16. [CANCELLED]

17. [PREVIOUSLY AMENDED] A router as claimed in claim 12, wherein the forwarding policy corresponds to one of:

a pass decision, in which the LSA is forwarded to a downstream link; and

a discard decision, in which the LSA is discarded without forwarding.

18. [ORIGINAL] A router as claimed in claim 17, wherein the means for implementing the forwarding policy further comprises means for updating a forwarding table using information contained in the LSA as either one of an inclusion route and an exclusion route.

19. [ORIGINAL] A router as claimed in claim 12, further comprising means for asserting the route tag in respect of the LSA.

20. [ORIGINAL] A router as claimed in claim 19, wherein the means for asserting the route tag comprises:

means for setting a route tag value respecting the LSA; and

means for inserting the route tag into a predetermined field of the LSA.

21. [ORIGINAL] A router as claimed in claim 20, wherein the means for setting the route tag value comprises a policy having a match criteria corresponding to one or more predetermined attributes of the LSA.

22. [ORIGINAL] A router as claimed in claim 21, wherein the one or more predetermined attributes comprise any one or more of: a source address; a source area; a destination address; and a destination area.

23. [ORIGINAL] A router as claimed in claim 20, wherein the router is an ABR, and the means for inserting the route tag is adapted to insert the route tag value into an external route tag field of a Type-5 LSA.

24. [ORIGINAL] A router as claimed in claim 20, wherein the router is an ABR, and the means for inserting the route tag is adapted to insert the route tag value into an internal route tag field of a modified Type-3 LSA.

25. [PREVIOUSLY AMENDED] A software program stored on a computer readable medium for controlling a router to enable policy-based traffic forwarding in a data network having at least two routers, each router hosting an area of the data network, the software program comprising program code adapted to control propagation of a received link state advertisement (LSA) message, into a respective area of the data network hosted by the router, using a respective forwarding policy having a match criteria corresponding to a route tag asserted in respect of the LSA, wherein the

respective forwarding policy of a first router differs from that of a second router, such that the received LSA message is flooded into the area hosted by the first router, and not flooded into a respective second area hosted by the second router.

26. [CANCELLED]

27. [PREVIOUSLY AMENDED] A software program as claimed in claim 25, wherein the program code adapted to implement the forwarding policy further comprises program code adapted to control the router to update a forwarding table using information contained in the LSA as either one of: an inclusion route and an exclusion route.

28. [PREVIOUSLY AMENDED] A software program as claimed in claim 25, further comprising program code adapted to control the router to assert the route tag in respect of the LSA.

29. [PREVIOUSLY AMENDED] A software program as claimed in claim 28, wherein the program code adapted to control the router to assert the route tag comprises:

program code adapted to control the router to set a route tag value respecting the LSA; and

program code adapted to control the router to insert the route tag into a predetermined field of the LSA.

30. [PREVIOUSLY AMENDED] A software program as claimed in claim 29, wherein the router is an ASBR, and the program code adapted to control the router to insert the route tag is adapted to control the router to insert the route tag value into an external route tag field of a Type-5 LSA.

31. [PREVIOUSLY AMENDED] A software program as claimed in claim 29, wherein the router is an ABR, and the program code adapted to control the router to insert the

route tag is adapted to control the router to insert the route tag value into an internal route tap field of a modified Tme-3 LSA.

9) Evidence Appendix

None

10) Related Appeals Appendix

None

Early action in respect of this Appeal will be greatly appreciated.

Respectfully submitted,
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